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Exploring Factors Influencing Market Engagement and Marketing Channel Selection among Smallholder Macadamia Farmers in Embu West Sub County, Kenya

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This study delves into market participation and marketing channel preferences among smallholder Macadamia farmers in Embu West Sub County, Kenya. Employing a stratified multistage sampling procedure and multinomial logit regression analysis, the research reveals that despite offering lower prices, brokers remain the favored marketing channel. Several factors, including age, farming experience, consideration of macadamia quality, information flow, farm size, distance to market, payment period, and education level, significantly influence farmers' channel choice. The findings underscore the importance of policy interventions emphasizing non-price incentives, such as enhanced extension services and dissemination of macadamia marketing information, to encourage participation in more lucrative markets.
Keywords: Marketing channel, Smallholder farmer, Macadamia, stratified sampling, multinomial logit.

INTRODUCTION

Macadamia are edible nuts that have gained popularity globally due to their high nutritional value (Murioga *et al.*, 2016; Zuza *et al.*, 2021) and account for 1% of the total world tree nuts (Hardner *et al.,* 2019; Muchangi *et al.*, 2021). The crop has high economic value and farmers have taken its high returns as an incentive to grow the crop (Mbogo *et al.*, 2021; Perdoná & Soratto, 2015). Other countries are also engaged in Macadamia production with the largest producer being South Africa followed by Australia which account for over half of the total world's macadamia production (Bouarakia *et al.*, 2023). Kenya is an emerging competitor contributing (13%) of total world's macadamia production (Brinkhoff & Robson, 2020; Mbogo *et al.*, 2021; Muchangi *et al.*, 2021). Macadamia was introduced to Kenya in 1946 by a researcher called Bob Harris and his primary intention was to diversify farmers' income from the deteriorating coffee sector however, due to the potentials of the crop it was adopted for other uses such as beauty and shade (Perdoná and Soratto 2015; Canwat *et al.*, 2020). Macadamia production is practiced in many parts of the country with eastern and central parts of the country being the largest producers. It is acknowledged that the contribution according to county are Embu (36.5%), Murang'a (17.2%), Meru (11.8%), Machakos

(7.8%), Kiambu (7%), Nyeri (5.8%), Tharaka Nithi (5.5%) and Kirinyaga (4.4%). Although the crop is mainly grown for income generation farmers have not fully benefited from the sector due to factors such as inadequate access to appropriate market information and extension services that results to making smallholder farmers participate in least rewarding market channels (Mgale and Yunxian 2020; Lee, Liu, and Chang 2020; Wasilwa *et al.*, 2019). Producers of the crop consists of smallholder farmers who in most cases are constrained by inadequate market information and tend to participate in channels that are readily available to them without knowledge of other rewarding channels (Reddy *et al.,* 2018). Therefore, harnessing the potentials of these smallholder farmers and making it necessary to make market information and extension services readily available to them to enable them participate in the most rewarding channels.
Macadamia market is characterized by price fluctuations and unstable structure where every actor seeks to benefit itself, resulting to factories and companies sourcing macadamia from both farmers and brokers which makes farmers in most cases to be inconsistent on whom they sell resulting to low prices (Adaobi *et al.*, 2020). Effective market participation acts as an economic incentive and is a major driver of rural development as it assures better incomes and improved food security to smallholder farmers. The existence of appropriate

marketing channels and improved market access is key to smallholder farmers as it results to agricultural and economic development (Dukpa 2020; Kalita 2017; Mgale and Yunxian 2020). Despite this, smallholder macadamia farmers are facing constraints in terms of access to market information and extension services that results to them not fully benefiting from the sector (Hagos *et al.,* 2020)

Most studies in macadamia have not focused on marketing therefore this study sought to fill the knowledge gap in marketing and to explore on factors influencing engagement and market channel selection among smallholders Macadamia farmers in Embu West Sub County, Kenya.

MATERIALS AND METHODS

The study was conducted in Embu County, Kenya located in latitude 0^0 31'58.80^{0}N and longitude 37^{0}27'0 00E with a temperature ranging between 12°C to 27°C. Average annual rainfall, depending on altitude ranges from 640 mm to 1495 mm with July being the coldest month and September with the highest temperatures (Wambua *et al.,* 2019). Rainfall pattern is bimodal with two distinct rainy season where long rains are experienced from March to May, while short rains are between October and November. The County is classified in the upper midland 2 and upper midland 3 zones.

The target population of the study was all smallholder Macadamia farmers in Embu West Sub-County. Stratified multistage sampling was used to obtain the 337 smallholder macadamia farmers. Structured questionnaires were used to collect data. In the first stage three out of the five locations/wards were selected in the Sub County on basis of high macadamia production. On the second stage two sub locations out of the three selected locations were randomly selected totaling to six. In the third stage twelve villages were sampled where two villages were randomly considered per sub location and probability to size was used to randomly select farmers who were interviewed according to every village.

The study limitation was that due to insufficiency of resources and time the study only focused on a small area (Embu West Sub County, Kenya). However, macadamia farming is practiced in other parts in Kenya. Further studies can be carried out in other counties to validate the results.

The multinomial Logit regression model was applied to analyze market engagement and marketing channel choice. The available marketing channels considered included marketing through brokers, market organizations, local traders and factories.

The multinomial logit regression model was expressed as:

$$Yij = \beta_0 + \beta_1 X_1 + \cdots + \beta_K X_K + \varepsilon \qquad (1)$$

Where, yij is the probability of choosing a certain marketing channel and i represent the market channel chosen by the Yth farmer; β is the coefficient of independent variables, β_0 is the constant and X are the social economic and market factors (independent variables) and ε is the disturbance term.

RESULT

***Social economic and market factors*:** The mean values were computed for selected social economic and market factors. The Analysis of Variance (ANOVA) was used to test the significance of the variations in the mean values. As shown in table 1 results indicate that age was high (65.39 years) in marketing through factories and this implied that the elderly preferred selling through factories. Farm size was largest (1.56 hectares) for those marketing through factories while farm size under macadamia was largest in farmers who marketed through factories (1.17hectares) indicating that the more the farmers had access to land the more they allocated it to macadamia production. Farming experience was highest (42.55years) in marketing through factories indicating that as the years in macadamia farming increased farmers were more willing to involve in more lucrative markets. Prices were highest in marketing through factories (109.90 Kenya shilling) mainly because no intermediaries were involved. Quantity supplied to market was highest in factories (878.43

Table 1. ANOVA results showing estimated mean of selected social economic and market factors (no. of obs = 337).

	Mean				
	Local traders (23.4%)	**Brokers (48.1%)**	**Market organization (13.4%)**	**Factories (15.1%)**	**Sig.**
Household size	4.08	4.85	4.22	4.75	0.43
Age	39.97	47.95	61.25	65.39	0.01*
Education	7.05	5.63	6.96	5.92	0.43
Farm size	0.81	0.92	1.13	1.56	0.08**
Farm size under macadamia	0.05	0.06	0.12	.17	0.06**
Experience	18.89	24.78	38.22	42.55	0.01*
price	77.22	82.01	100.32	109.90	0.01*
Kgs sold	119.43	176.42	522.44	878.43	0.03*
Distance to market	2.11	3.31	4.82	5.95	0.07**

*Asterisks** and * indicate significance at 5% and 10% respectively*

Table 2. Estimated mean of market factors

Market factors	Local traders (23.4%)	Brokers (48.1%)	Market organization (13.4%)	Factories (15.1%)
Access to extension				
Yes (%)	0.10	0.27	0.30	0.33
No (%)	99.90	99.73	99.70	99.67
Group membership				
Yes (%)	0.17	0.29	1.22	1.32
No (%)	99.83	99.71	98.78	98.68
Access to market information				
(Yes)	0.98	0.32	2.19	1.22
(No)	99.02	99.68	97.81	98.78

kilograms) because factories were characterized by buying bulk products. However, distance to the market was highest in marketing through factories (5.95 kilometers) as the factories were mostly near the urban centers.

Market factors: The frequency of market factors was computed among the four different market channels to show the occurrence. Statistics in table 2 revealed that access to extension was very low in the area and a few farmers who received extension services were linked to sell their macadamia through marketing organizations or factories as they had private extension personnel who would visit and train smallholder farmers. This low penetration resulted to majority of farmers selling their Macadamia to local traders or brokers. A majority of farmers were not affiliated to any farmer group and this also translated to making most farmers to trade with brokers and local traders due to lack of market power. Farmers who were affiliated to a group were linked to sell Macadamia mostly in market organization and factories.

Choice of marketing channel: It was found that majority of the farmers preferred selling their macadamia to brokers who were intermediaries who bought macadamia from farmers and sold to marketing organizations or factories. A plausible explanation on choice of brokers was due to the fact that it was the only channel known to them in the rural areas, made its payment on spot and was not quality sensitive as they were only interested with large sized nuts. Farmers relied on money from Macadamia to meet their daily needs and were attracted by the instant payment. Local traders were intermediaries who bought macadamia along the road side and sold to direct consumers in the market, some bought a specific variety such as macadamia tetraphylla and sold to seedling growers while others bought macadamia on the basis of size and sold to brokers. The reason for choosing local traders was that they were accessible, made payment on the spot and it helps to avoid theft as they would purchase the macadamia throughout the year.

Marketing organizations were a newly introduced channel within the county that involved private organizations that bought macadamia mainly on basis of quality aspects beyond size and checked colour of the nuts and fully matured nuts.

The channel would process and sell the macadamia to both local and international market. The channel was chosen by farmers who preferred better prices and where it was the only marketing outlet available to buy huge quantities. The channel made payment within one week and some farmers were reluctant due to the delayed payment. Factories was a channel that bought macadamia both in the region and in other neighboring counties on basis of quality such as large sized nuts, checked colour of nuts, fully matured nuts and nuts free from residues. Factories bought large quantities and would process and sell in both local and international market. The channel was preferred by farmers who cared about better prices and to farmers with huge quantities, payment for this channel was made within a period of one week.

The Influence of Market and Social Economic Factors on the Choice of Marketing Channels: Multinomial Logit regression model was used to determine the factors influencing the choice of Macadamia marketing channels among small holder farmers. Marketing through brokers attracted most farmers according to descriptive analysis and was therefore used as a benchmark category. The marginal effect from the multinomial Regression analysis measures the expected change in the probability of a particular choice being made with respect to a unit change in an independent variable.

DISCUSSION

The Influence of Market and Social Economic Factors on the Choice of Marketing Channels: As shown in table 3, the study findings revealed that distance to market negatively affects the choice of local traders. Increase in distance to market increases the probability of choosing brokers against that of choosing local traders as many farmers prefer covering shorter distances to markets. Brokers travel long distances to buy products from farmers at their farm gate and would cater their costs thus farmers would not incur transaction costs and hence considered this more convenient to them which is in line with the findings of Sahara *et al.* (2015), Bouarakia *et al.* (2023), Kumar *et al.* (2015) who found out that farmers preferred markets nearer them. Results further showed that

Table 3. Multinomial Logistic Regression Results.

Market channel preference Base outcome (brokers)	Marginal effects	St. Err.	t-value	p-value	[95% Conf Lower limit	Interval] Upper limit	Sig
Local traders							
Distance to market	-0.052	50.810	2.86	0.004	3.181	491.066	***
Information Flow	0.125	0.973	1.65	0.067	0.866	5.214	*
Payment period	-0.045	0.333	-0.23	0.780	0.567	2.378	
Age	0.588	0.172	-1.82	0.069	0.331	1.043	*
Gender	0.916	0.365	-0.22	0.827	0.419	2.002	
Education level	0.811	0.202	-0.89	0.375	0.488	1.311	
Experience	0.839	0.540	2.08	0.038	1.034	3.271	**
Constant	0.001	0.002	-3.12	0.002	0.000	0.075	***
Market organizations Distance to market	-0.012	0.019	0.00	0.996	0.000	0.000	
Information flow	0.891	0.619	-0.17	0.868	0.228	3.476	
Macadamia quality consideration	-0.036	2.032	2.01	0.044	1.033	10.988	**
Payment period	-0.235	0.123	4.16	0.056	2.346	4.790	*
Age	0.111	0.066	-3.69	0.000	0.035	0.357	***
Gender	0.872	2.094	1.45	0.148	0.688	11.989	
Education level	0.133	0.093	-2.89	0.004	0.034	0.524	***
Experience	0.312	0.960	2.02	0.044	1.023	5.214	**
Constant	0.596	766145.390	0.00	0.998	0.000	0.000	
Factories							
Distance to market	-0.063	0.003	0.00	0.096	0.000	0.000	*
Information flow	0.696	1.804	1.48	0.138	0.727	10.003	
Macadamia quality consideration	0.097	0.129	-0.16	0.037	0.755	1.268	**
Payment period	-0.569	95.000	3.17	0.043	0.488	1.463	**
Age	0.944	0.364	-0.15	0.882	0.444	2.008	
Gender	0.581	0.334	-0.94	0.345	0.188	1.793	
Education level	0.059	0.355	0.17	0.864	0.549	2.043	
Experience	0.088	0.235	-0.47	0.048	0.524	1.487	**
Constant	0.053	2.031	0.00	0.997	0.000	0.075	
Mean dependent var	1.285		SD dependent var		0.721		
Pseudo r-squared	0.510		Number of obs		337.000		
Chi-square	48.827		Prob > chi2		0.001		
Akaike crit. (AIC)	417.972		Bayesian crit. (BIC)		509.654		

*** implies significant at 1%, ** implies significant at 5% while, * implies significant at .10%
Source: *Authors computation using study data (2024)*

information flow had a positive effect on the choice of marketing through local traders.

Brokers mainly do not spend time interacting with farmers due to their mobility, and inconsistency where in every season new brokers participated compared to local traders who were always accessible to farmers throughout the year which is in line with the finding of Innocent (2018) that brokers were exploitive and could not release information easily. Age was found to affect the choice of local traders positively where the aged disliked the brokers due to their opportunistic behavior and inaccessibility especially when macadamia were on a low season. Experience was another factor that was found to affect local traders positively. It was established that increasing experience resulted to increased probability of choosing local traders over brokers as brokers were found to have an exploitative behavior since they were not consistent and in

every season new brokers were witnessed. This erodes trust and corroborates with the findings of Dessie *et al.* (2018) on why wheat farmers disliked broker channel.

Considering the factors influencing the choice of marketing organizations, it was found that quality considerations for macadamia had a negative effect on the choice of market organization. Brokers were not quality sensitive and could buy the kernels of poor quality but at relatively lower prices which agrees with the finding of Lee *et al.* (2020) that lucrative markets were more concerned with good quality nuts. Some farmers were reluctant to adhere to quality considerations making them not participate in more rewarding markets (Plakias *et al.* 2020). Payment period negatively affected choice of marketing organizations over the brokers who made payment on the spot, marketing organizations could delay for up to a week hence making farmers more

reluctant to choosing this channel. This was consistent with the finding of Kaygisiz (2021) and Bannor *et al*. (2023) that delayed payments discouraged farmers from participating in a certain marketing channel. Further it was found that age had a positive effect on the choice of marketing organizations. Specifically, it was realized that when age is increased the probability of choosing brokers over marketing organizations decreases because the aged engaged in more off farm income and relied on other enterprises compared to other age sets and thus were more tolerant to delayed better prices compared to instant low prices. The aged also were associated with large ownership of land and had allocated more land to Macadamia farming that result in large volumes. Jitmun and Kuwornu (2019) Found that the aged had large pieces of land and would allocate more to specific crops. Education level of respondents affected the choice of marketing organizations positively and that increasing the respondent's education level increased the probability of choosing marketing organizations over brokers that is consistent with the study by Zakaria *et al.* (2020) and Muriithi *et al.* (2021) that education level influenced farmers making more informed decisions. Multinomial logit analysis further revealed that increase in experience decreases the probability of choosing brokers in favor of marketing organizations since those who had traded for many years were more willing to venture in more lucrative markets (Chiv *et al.,* 2020).

When significant factors that affected the choice of factories as a marketing channel were considered, the findings revealed that, distance to market had a negative effect on the choice of factories because farmers were reluctant to cover long distances (Kiprop *et al.,* 2020) and at times disliked transaction costs such as transportation costs since this would lower their total income (Hung and Khai, 2020; Mossie *et al.,* 2020). Quality considerations for Macadamia was found to have a positive effect on the choice of factories where farmers who were quality sensitive disliked brokers who buy quality nuts at low prices. Payment period negatively affected choice of factory because many farmers preferred instant payment which corroborates with the study by Siddique *et al.* (2018) that shorter payment periods attracted more farmers to participate in a certain market. Finally, it was established that experience had a positive effect on the choice of factories as a marketing channel. The more the years farmers practiced Macadamia farming the more they would be willing to participate in factories because they considered their money safe. In addition, factories offer financial security through aspects such as acquiring loans and savings through the cooperatives.

Conclusion: The study identified age, farming experience, and years in education, distance to market, payment period, and information flow and quality consideration for macadamia to significantly affect engagement and choice of marketing channel. The study concludes that brokers were the most preferred although they offered lower prices and that marketing organizations were the least preferred channel.

The study recommended that policymakers should put in place feasible strategies such as non-price incentives like introducing more extension services and information dissemination to smallholder farmers that can help them participate in more lucrative markets like the factories. Aspects such as trainings on quality consideration should be incorporated to help smallholder farmers benefit from high value markets. The study recommends that policymakers should invest more in developing stable macadamia markets such as putting in place feasible strategies on introduction of collection centers, and encourage group membership by farmers so as to gain market power for participating in organized markets through covering shorter distances.

Ethical statement: This article does not contain any studies regarding human or animal.

Availability of data and materials: We declare that the submitted manuscript is our work, which has not been published before and is not currently being considered for publication elsewhere.

Consent to participate: All authors participated in this research study.

Consent for publication: All authors submitted consent to publish this research article in JGIAS.

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